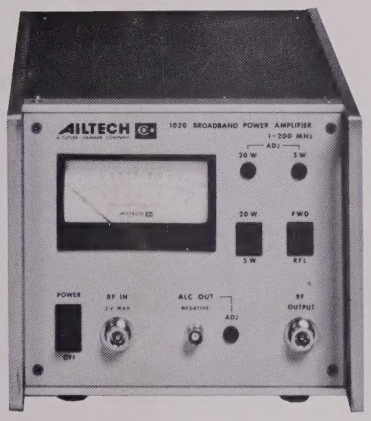
INSTRUCTION MANUAL FOR

AILTECH

BROADBAND AMPLIFIERS



MP MASTER
MA23211

AILTECH
DIVISION CUTLER-HAMMER
CONTROL

Use AILTECH supplied power cord(s)
when operating AILTECH equipment.

OPERATION AND MAINTENANCE MANUAL

AILTECH
BROADBAND AMPLIFIERS

PRINTED IN U.S.A.

EATON Advanced Electronics

Eaton Corporation
Electronic Instrumentation Division
Los Angeles, California 90066

WARRANTY

Eaton Corporation, Electronic Instrumentation Division, Los Angeles Plant, (SELLER) warrants each new instrument to be free from defects in material and workmanship, effective after delivery to the original purchaser as follows:

Electrical and Electronic Measuring Instruments .....1 Year

Repair or replacement (at our option) without charge (F.O.B. factory) will be effected when our examination satisfactorily indicates that defects are due to workmanship or materials. Electron tubes, semiconductors, batteries, fuses, lamps, thermoelements, and Ratio Tran potentiometers are excluded from warranty coverage. Warranty returns must first be authorized by the factory.

If the instrument or any portion thereof, has been abused, misused, damaged by accident or negligence, or if any serial number or seal has been removed or altered, the warranty is void.

This warranty is in lieu of all other warranties, express or implied INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY, or fitness for a particular purpose. In no event shall the SELLER be liable for INCIDENTAL OR CONSEQUENTIAL damages. The SELLER neither assumes, nor authorizes any person to assume for it, any other liability in connection with sales of instruments manufactured by SELLER.

With respect to repairs, the foregoing warranty shall apply for a period of ninety days to the repaired portion.

Eaton Corporation,
Electronic Instrumentation Division, Los Angeles Plant
5340 Alla Road, Los Angeles, California 90066

REPAIR AND MAINTENANCE

Instruments should be returned only on prior authorization from the Representative or the factory. You will be advised of detailed shipping instructions at that time. Return the instrument to the factory Prepaid. Validity of warranty will be determined by the factory.

Chargeable repairs: If requested, an estimate of charges will be made prior to repairs. Please provide us with the following information in order to expedite the processing of your instrument:

1. Model or Type
2. Serial Number
3. Description of trouble(1)
4. Approximate date instrument was placed in operation.
5. Approximate number of hours in use.
6. Maintenance action previously requested or performed.
7. Other comments.

(1) Include data on symptoms, measurements taken, suspected location of trouble, maintenance action taken and any other relevant data.

POWER PROTECT CIRCUIT INFORMATION

Your AILTECH broadband amplifier incorporates new protection circuitry that greatly reduces the chance of amplifier damage under conditions of high load VSWR.

The protect circuit is fully automatic; operation of the amplifier is unchanged. You will notice, however, that a red LED indicator has been added to the front panel of the instrument. If the amplifier is inadvertently subjected to a combination of excessive drive and load conditions that could be harmful, the LED will light to indicate operation of the protect circuitry. When this happens, input attenuation is applied to the amplifier to hold the output within safe operating limits. The operator should then immediately reduce the amplifier drive, or correct the load conditions, so that the LED does not remain illuminated!

The added protect circuitry should not be relied upon as a substitute for reasonable precautions in operation. UNDER SOME SEVERE CONDITIONS OF LOAD MISMATCH AND OVERDRIVE, IT IS STILL POSSIBLE TO DAMAGE THE AMPLIFIER. The addition of the protect circuitry does not remove the obligation of the customer to operate the equipment under conditions of proper and normal use.

For warranty purposes, the manufacturer reserves the right of judgment as to whether component failure is the result of improper or abnormal operation.

ADDENDUM
FOR
MANUAL NO. 1-500783-372
BROADBAND AMPLIFIERS

ERRATA

Correct the following errors in the above manual:

Change all references to Model 10512 or 20512 or 35512A to Model 1052 or 2052B or 3552B.

Table 1. Specifications

Model 1052 or 2052B or 3552B:

Frequency Response; WAS: 100 - 520 MHz
IS: 100 - 512 MHz

	TITLE ADDENDUM Broadband Amplifiers	DWG NO. 1- 500783-372 SHEET 1.1 OF	APPROVED 7/13/83 REVISED

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WARNING!

When operating, hazardous voltages are present in this unit.

AILTECH RF Power Sources, when connected to radiating devices, are capable of generating high intensity electric fields. High level fields may be harmful to humans. Reasonable precaution should be taken to avoid prolonged exposure to high strength fields.

AILTECH makes NO specific recommendations as to "human susceptibility" but advises users to investigate and determine power limits and conditions for safety of personnel.

PREFACE

The general operation of AILTECH's expanding line of linear power amplifiers, with their specifications and performance verification, is described in this manual.

AILTECH solid-state linear amplifiers are designed to be driven by signal sources such as milliwatt sweepers and frequency synthesizers.

AILTECH linear amplifiers feature a true directional wattmeter to measure forward and reflected power delivered to the load. Additionally, an output sample dc voltage from the directional coupler, proportional to the forward power, is made available to the front panel for external leveling. Leveling the amplifier's output increases the flatness typically by a factor of two, and improves the effective output impedance. In order to accomplish the above operation, it is necessary to use a source with external leveling capability and a negative input voltage requirement.

SECTION I
INTRODUCTION

The AILTECH 32 Precision IF Attenuator (Figure 1) is an attenuation standard designed for use at a fixed intermediate frequency. It may be used in the laboratory, in test instruments, or as part of a custom-built test system. The attenuation is continuously variable from 0 to 100 dB above the minimum insertion loss of the instrument.

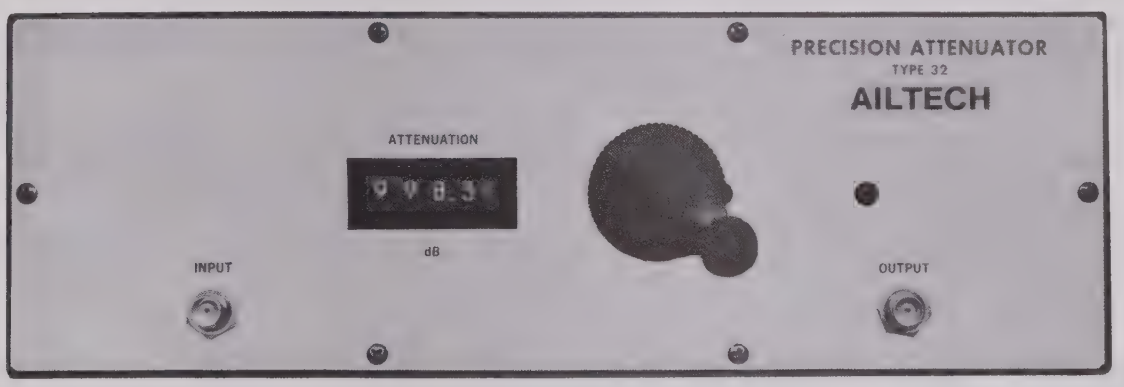


FIGURE 1. AILTECH 32 PRECISION ATTENUATOR

TABLE 1. SPECIFICATIONS

	1020
POWER OUTPUT	10 watts minimum, 20 watts available over most of the band
COMPRESSION	Less than 1 dB at 10 watts output
FREQUENCY RESPONSE	1-200 MHz Usable 500 kHz to 225 MHz
GAIN	40 dB Minimum
GAIN VARIATION	±1.5 dB (at all power levels up to 10 watts)
TOTAL HARMONIC DISTORTION	All harmonics more than 25 dB down
INPUT VSWR	1.5:1 Typical
LOAD IMPEDANCE	Will deliver rated performance into load VSWRs as high as 1.5:1
NOISE FIGURE	9 dB Maximum
PROTECTION	Unit will withstand 10 dB overdrive with output load VSWR of 1.5:1.
OUTPUT METERING	True directional wattmeter for both forward and reflected power. A dc sample voltage proportional to forward power, nominally -1 volt at 10 watts output for external leveling. (See Diagram)
POWER REQUIREMENTS	115/230 volts ±10% 50/60 Hz, 125 watts nominal.
SIZE:	7" x 8-1/2" x 17" (17.8x21.6x43.2cm)
WEIGHT:	22 lbs. (10KG)

TABLE 1. SPECIFICATIONS

	2020
POWER OUTPUT	20 watts minimum, 35 watts available over most of the band
COMPRESSION	Less than 1 dB at 20 watts output
FREQUENCY RESPONSE	1-200 MHz Usable 500 kHz to 225 MHz
GAIN	43 dB Minimum
GAIN VARIATION	±1.5 dB (at all power levels up to 20 watts)
TOTAL HARMONIC DISTORTION	All harmonics more than 25 dB down
INPUT VSWR	1.5:1 Typical
LOAD IMPEDANCE	Will deliver rated performance into load VSWRs as high as 1.5:1
NOISE FIGURE	9 dB Maximum
PROTECTION	Unit will withstand 10 dB overdrive with output load VSWR of 1.5:1.
OUTPUT METERING	True directional wattmeter for both forward and reflected power. A dc sample voltage proportional to forward power, nominally -1 volt at 20 watts output for external leveling. (See Diagram)
POWER REQUIREMENTS	115/230 volts ±10% 50/60 Hz, 350 watts nominal.
SIZE:	17-1/4" x 17" x 7" (43.8x43.2x17.8 cm)
WEIGHT:	43 lbs. (19.5 kg)

TABLE 1. SPECIFICATIONS

	5020
POWER OUTPUT	50 watts minimum, 75 watts available over most of the band
COMPRESSION	Less than 1 dB at 40 watts output
FREQUENCY RESPONSE	1-200 MHz Usable 500 kHz to 225 MHz
GAIN	47 dB Minimum
GAIN VARIATION	±1.5 dB (at all power levels up to 50 watts)
TOTAL HARMONIC DISTORTION	All harmonics more than 25 dB down
INPUT VSWR	1.5:1 Typical
LOAD IMPEDANCE	Will deliver rated performance into load VSWRs as high as 1.5:1
NOISE FIGURE	9 dB Maximum
PROTECTION	Unit will withstand 10 dB overdrive with output load VSWR of 1.5:1.
OUTPUT METERING	True directional wattmeter for both forward and reflected power. A dc sample voltage proportional to forward power, nominally -1 volt at 50 watts output for external leveling. (See Diagram)
POWER REQUIREMENTS	115/230 volts ±10% 50/60 Hz, 500 watts nominal.
SIZE:	17-1/4" x 17" x 7" (43.8x43.2x17.8 cm)
WEIGHT:	45 lbs. (20.3 kg)

TABLE 1. SPECIFICATIONS

	5001
POWER OUTPUT	50 watts minimum, 75 watts available over most of the band
COMPRESSION	Less than 1 dB at 40 watts output
FREQUENCY RESPONSE	10 kHz - 10 MHz
GAIN	37 dB Minimum (10 mW input for rated output)
GAIN VARIATION	±1.5 dB (at all power levels up to 30 watts)
TOTAL HARMONIC DISTORTION	All harmonics more than 20 dB down
INPUT VSWR	- - - - - - -
LOAD IMPEDANCE	Will deliver rated performance into load VSWRs as high as 1.5:1
NOISE FIGURE	- - - - - -
PROTECTION	Unit will withstand 10 dB overdrive with output load VSWR of 1.5:1.
OUTPUT METERING	True directional wattmeter for both forward and reflected power. A dc sample voltage proportional to forward power, nominally -1 volt at 50 watts output for external leveling.
POWER REQUIREMENTS	115/230 volts ±10% 50/60 Hz, 500 watts nominal.
SIZE:	7" x 8-1/2" x 17" (17.8x21.6x43.2 cm)
WEIGHT:	43 lbs. (19.5 kg)

TABLE 1. SPECIFICATIONS

	15100
POWER OUTPUT	20 watts minimum, 30 watts available over most of the band
COMPRESSION	- - - - - - - - - -
FREQUENCY RESPONSE	500-1000 MHz 460-1000 MHz (Dash 2 Option)
GAIN	42 dB Minimum (1 mW input for full rated output)
GAIN VARIATION	±3 dB (at all power levels up to rated)
TOTAL HARMONIC DISTORTION	All harmonics more than 25 dB down
INPUT VSWR	3:1 Typical
LOAD IMPEDANCE	Will deliver rated performance into load VSWRs as high as 1.5:1
NOISE FIGURE	3:1 Typical
PROTECTION	Unit will withstand 10 dB overdrive with output load VSWR of 1.5:1.
OUTPUT METERING	True directional wattmeter for both forward and reflected power. A dc sample voltage proportional to forward power, nominally -1 volt at 10 watts output for external leveling.
POWER REQUIREMENTS	115/230 volts ±10% 50/60 Hz, 500 watts nominal.
SIZE:	17-1/4" x 17" x 7" (43.8 x 43.2 x 17.8 cm)
WEIGHT:	43 lbs. (19.5 kg)

TABLE 1. SPECIFICATIONS

	20512
POWER OUTPUT	25 watts minimum, 35 watts available over most of the band
COMPRESSION	Less than 1 dB at 20 watts
FREQUENCY RESPONSE	100-520 MHz
GAIN	43 dB Nominal (1 mW input for full rated output)
GAIN VARIATION	±2 dB (at all power levels up to rated)
TOTAL HARMONIC DISTORTION	All harmonics more than 25 dB down
INPUT VSWR	2:1 Typical
LOAD IMPEDANCE	Will deliver rated performance into load VSWRs as high as 1.5:1
NOISE FIGURE	9 dB Typical
PROTECTION	Unit will withstand 10 dB overdrive with output load VSWR of 1.5:1.
OUTPUT METERING	True directional wattmeter for both forward and reflected power. A dc sample voltage proportional to forward power, nominally -1 volt at 20 watts output for external leveling.
POWER REQUIREMENTS	115/230 volts ±10% 50/60 Hz, 400 watts
SIZE:	17-1/4" x 17" x 7" (43.8 x 43.2 x 17.8 cm)
WEIGHT:	43 lbs. (19.5 kg)

TABLE 1. SPECIFICATIONS

	35512A
POWER OUTPUT	50 watts minimum, 75 watts available over most of the band
COMPRESSION	Less than 1 dB at 35 watts
FREQUENCY RESPONSE	100-520 MHz
GAIN	43 dB Nominal (1 mW input for full rated output)
GAIN VARIATION	±2 dB (at all power levels up to rated)
TOTAL HARMONIC DISTORTION	All harmonics more than 25 dB down
INPUT VSWR	2:1 Typical
LOAD IMPEDANCE	Will deliver rated performance into load VSWRs as high as 1.5:1
NOISE FIGURE	9 dB Typical
PROTECTION	Unit will withstand 10 dB overdrive with output load VSWR of 1.5:1.
OUTPUT METERING	True directional wattmeter for both forward and reflected power. A dc sample voltage proportional to forward power, nominally -1 volt at 20 watts output for external leveling.
POWER REQUIREMENTS	115/230 volts ±10% 50/60 Hz, 500 watts
SIZE:	17-1/4" x 17" x 7" (43.8 x 43.2 x 17.8 cm)
WEIGHT:	43 lbs. (19.5 kg)

PERFORMANCE VERIFICATION

Performance of AILTECH linear amplifiers may be verified by using a power meter rated over the frequency range, a high-power attenuator, and a 100-dB step attenuator with .1-dB steps.

Connect the amplifier, attenuators, and power meter as shown in Figure 1.

a. Set the attenuator initially to 10 dB.

b. Increase power at the frequency source to the rated power of the amplifier.

c. Manually tune the frequency source over the amplifier's frequency range.

d. The step attenuator should not have to be varied more than the flatness specification to maintain a constant output power.

NOTE: This test assumes the output of the sweeper is constant over the measurement range. If it is not, add the sweeper's uncertainty to the above flatness specification.

To test for the 1-dB compression point, connect the amplifier as shown in Figure 1.

a. With the attenuator set in the 20-dB position, adjust the source to drive the amplifier to an output level at 10 dB below the 1-dB compression point.

b. Reduce the attenuation until the power increases to the 1-dB compression point.

c. The attenuation should not have to be decreased by more than 11 dB in this test.

To check the harmonic level, use a frequency source with harmonics and spurious signals 10 dB below the rated specification for the amplifier. Connect amplifier as shown in Figure 2.

CAUTION

Do not measure harmonics with amplifier operating above rated power. Check power level where measurement is made. (See Table 1 for specification.)

The internal directional flatness may be checked by connecting the amplifier as shown in Figure 3.

Adjust the source for an output of 3 dB below the rated power level for the amplifier. Without changing the level, vary the frequency over the bandwidth of the amplifier. The output power should not vary more than the rated specification, under leveled conditions. (See Table 1.)

If a sweeper with leveling is not available, it is still possible to check if the coupler voltage is present at the ALC connector. Operate the amplifier as shown in Figure 1. With the output set to full power, measure the ALC voltage with the adjustment potentiometer fully cw. The voltage should be greater than rated specification. (See Table 1.)

GENERAL OPERATION

Connect the AILTECH linear amplifier to a suitable source of line power. NOTE: Use only AILTECH supplied power cords when operating AILTECH equipment. The RF input is a signal within the frequency range of the amplifier, and an output level of 1 milliwatt or less. Connect as shown in Figure 4. If leveled operation is desired, connect ALC as shown in Figure 3.

CAUTION

AILTECH linear amplifiers are designed to withstand an overdrive of 10 dB above the input power level required for rated output power with an output load VSWR of 1.5:1 or less. For load VSWR's greater than 1.5:1, limit drive to an input power level required for full rated output into a 1:1 load VSWR. If the above conditions are met, AILTECH linear amplifiers will be stable and protected under any load VSWR. When operating any amplifier, especially into a high VSWR load, if increasing the input power does not increase the output power appreciatively, DO NOT OPERATE ABOVE THAT OUTPUT LEVEL UNDER ANY CONDITION.

REPAIR OF AILTECH LINEAR AMPLIFIERS

Included in this manual are simplified block schematics and interconnect wiring diagrams for the linear amplifiers. If difficulties arise in the linear amplifier's operation, the faulty module can be located quickly. In the event of a power supply failure, standard troubleshooting procedures may be applied, or the linear amplifier should be returned to AILTECH for repair.

If the trouble is traced to the amplifier module assembly, the repair is beyond the scope of this manual. It is strongly recommended that the local factory representative be contacted for repair information.

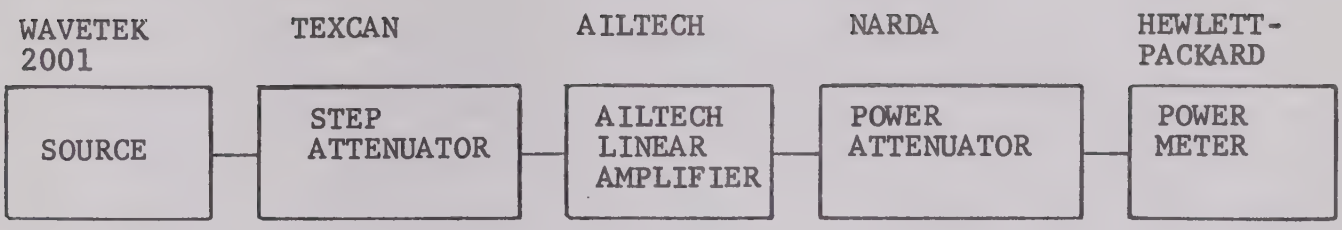


FIGURE 1

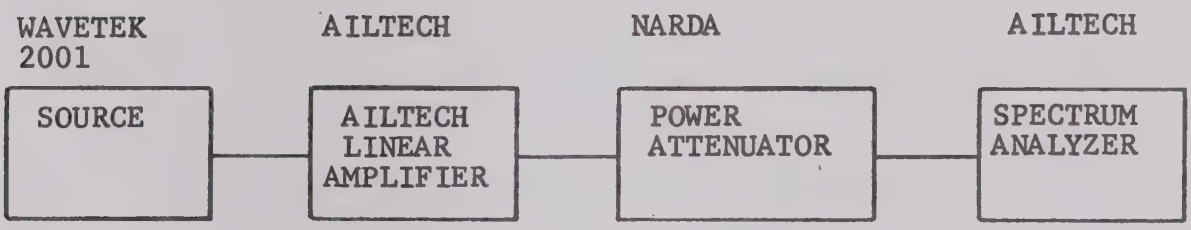


FIGURE 2

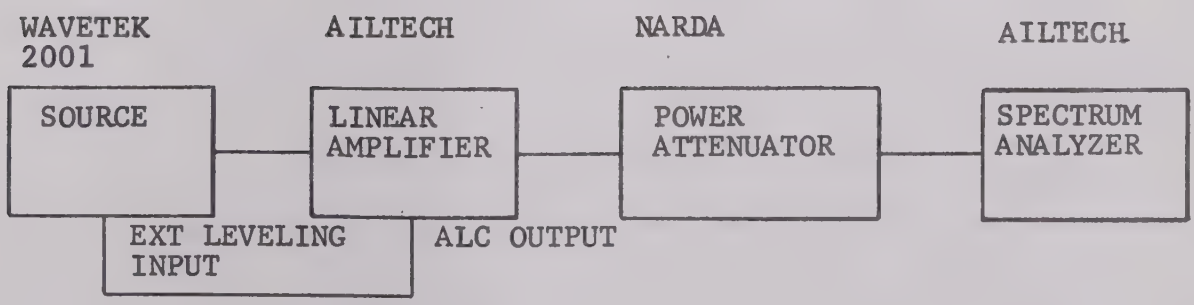


FIGURE 3

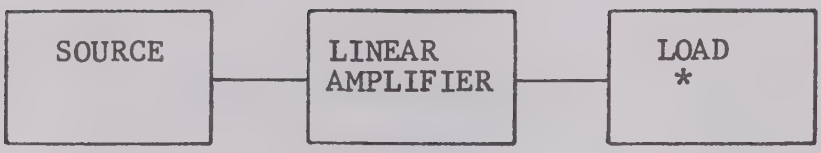


FIGURE 4

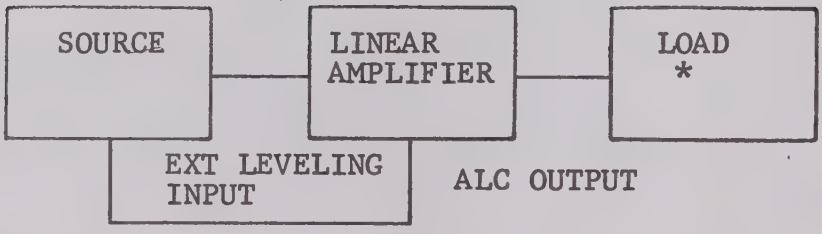


FIGURE 5

* See general operating instructions concerning overdrive with high Load VSWR.

VENDOR CODES

Code No.	Name and Address
04713	Motorola, Inc., Semiconductor Products Div., Phoenix, AZ
05245	Corcom Inc., Chicago, IL
05571	Sprague Electric Co., Pacific Div., Los Angeles, CA
09353	C & K Components, Inc., Watertown, MA
12678	AILTECH, a Cutler-Hammer Co., City of Industry, CA
14099	Semtech Corp., Newbury Park, CA
23936	Pamotor Div., Wm. J. Purdy Co., Burlingame, CA
28905	Elexon, Inc., Santa Ana, CA
50522	Monsanto Commercial Products Co., Electronics Special Products, Cupertino, CA
50579	Litronix, Inc., Cupertino, CA
51106	Standard Power, Inc., Santa Ana, CA
73138	Beckman Instruments, Helipot Div., Fullerton, CA
75915	Littelfuse, Inc., Des Plaines, IL

ELECTRICAL PARTS LIST, MODEL 1020

Symbol	Figure	Description	Part No.	Vendor
B101	6	Fan	4600	23936
F101	-	Fuse, Slo-Blo, 2A	313002	75915
J101	-	Recep., Power Line	6J4	05245
J405	6	Jack, Bulkhead	UG1094/U	Com'l
LED401	6	LED, Red	MV5054-3	50522
M401	6	Meter, 100 μa	B856-5427	12678
PS101	6	Power Supply	OLV60-28	28905
R401	8	Res.,2.7k,1/2W,5%	RC20GF272J	Com'l
R402	8	Potentiometer,10k	72P-R(10k)	73138
R403	8	Res.,27k,1/4W,5%	RC20GF273J	Com'l
R404	8	Potentiometer,10k	72P-R(10k)	73138
R405	8	Potentiometer,10k	72P-R(10k)	73138
R406	8	Res.,10k,1/4W,5%	RC07GF103J	Com'l
R407	8	Res.,10k,1/4W,5%	RC07GF103J	Com'l
S401	6	Switch	7101J62ZQ-2-2	09353
S402	6	Switch	7101J51CQ-2-2	09353
S403	6	Switch	7101J51CQ-2-2	09353
	6	Amplifier Module Assembly	D852-1109	12678
J402 P202	-	Cable Assembly	B852-0938-1	12678
J404 P204	-	Cable Assembly	B852-0938-2	12678

ELECTRICAL PARTS LIST, MODEL 2020

Symbol	Figure	Description	Part No.	Vendor
B101	7	Fan	4600	23936
B201	-	Fan	4600	23936
C401	8	Cap.,0.01μF	CK05BX103K	Com'l
C402	8	Cap.,0.01μF	CK05BX103K	Com'l
C403	8	Cap.,50μF,50V	39D506G050EE4	05571
C404	8	Cap.,50μF,50V	39D506G050EE4	05571
CR401	8	Diode	S2M	14099
CR402	8	Diode	S2M	14099
F101	-	Fuse, Slo-Blo, 5A	3AG-313-005	75915
IC401	8	Integrated Circuit	MC1741CL	04713
J101	-	Receptacle,Power Line	6J4	05245
J402	7	Jack, Bulkhead	UG1094/U	Com'l
LED401	7	LED, Red	RL5054-2	50579
M401	7	Meter	B856-5435	12678
PS101	7	Power Supply	SPS220-24-M1901	51106
R401	8	Res.,2.7k,1W,5%	RC32GF272J	Com'l
R402	8	Pot., 10k	72P-R(10K)	73138
R403	8	Res., Test Select	Selected	Com'l
R404	8	Pot., 10k	72P-R(10K)	73138
R405	8	Pot., 10k	72P-R(10K)	73138
R406	8	Res.,10k,1/4W,5%	RC07GF103J	Com'l
R407	8	Res., Test Select	Selected	Com'l
R408	8	Res.,10k,1/4W,5%	RC07GF103J	Com'l
R409	8	Res.,10k,1/4W,5%	RC07GF103J	Com'l
R410	8	Res.,750Ω,1W,5%	RC32GF751J	Com'l
R411	8	Res.,470Ω,1/4W,5%	RC07GF471J	Com'l
R412	8	Res.,470Ω,1/4W,5%	RC07GF471J	Com'l
R413	8	Res.,750Ω,1W,5%	RC32GF751J	Com'l
S401	7	Switch	7101J62ZQ22	09353
S402	7	Switch	7101J51CQ22	09353
S403	7	Switch	7101J51CQ22	09353
VR401	8	Diode, Zener	1N5242B	Com'l
VR402	8	Diode, Zener	1N5242B	Com'l
P201 & J401		Cable Assembly	B852-1089	12678
P202 & P301		Cable Assembly	B852-1090	12678
P302 & J403		Cable Assembly	B852-1091	12678
	7	Amplifier Module Assy.	B852-1131-1	12678
	7	Coupler Assembly	B852-1136	12678

ELECTRICAL PARTS LIST, MODEL 5020

Symbol	Figure	Description	Part No.	Vendor
B101	7	Fan	4600	23936
B201	-	Fan	7600S	23936
C401	8	Cap.,0.01μF	CK05BX103J	Com'l
C402	8	Cap.,0.01μF	CK05BX103J	Com'l
C403	8	Cap.,50μF,50V	39D506G050EE4	05571
C404	8	Cap.,50μF,50V	39D506G050EE4	05571
CR401	7	Diode	S2M	14099
CR402	7	Diode	S2M	14099
F101	-	Fuse, Slo-Blo, 8A	3AG-313-008	75915
IC401	8	Integrated Circuit	MC1741CL	04713
J101	-	Receptacle,Power Line	6J4	05245
J402	7	Jack, Bulkhead	UG1094/U	Com'l
LED401	7	LED, Red	RL5054-2	50579
M401	7	Meter	B856-5436	12678
PS101	7	Power Supply	SPS220-24-M1901	51106
R401	8	Res.,2.7k,1W,5%	RC32GF272J	Com'l
R402	8	Pot., 10k	72P-R(10K)	73138
R403	8	Res., Test Select	Selected	Com'l
R404	8	Pot., 10k	72P-R(10K)	73138
R405	8	Pot., 10k	72P-R(10K)	73138
R406	8	Res.,10k,1/4W,5%	RC07GF103J	Com'l
R407	8	Res., Test Select	Selected	Com'l
R408	8	Res.,10k,1/4W,5%	RC07GF103J	Com'l
R409	8	Res.,10k,1/4W,5%	RC07GF103J	Com'l
R410	8	Res.,750Ω,1W,5%	RC32GF751J	Com'l
R411	8	Res.,470Ω,1/4W,5%	RC07GF471J	Com'l
R412	8	Res.,470Ω,1/4W,5%	RC07GF471J	Com'l
R413	8	Res.,750Ω,1W,5%	RC32GF751J	Com'l
S401	7	Switch	7101J62ZQ22	09353
S402	7	Switch	7101J51CQ22	09353
S403	7	Switch	7101J51CQ22	09353
VR401	8	Diode, Zener	1N5242B	Com'l
VR402	8	Diode, Zener	1N5242B	Com'l
P201 & J401		Cable Assembly	B852-1089	12678
P202 & P301		Cable Assembly	B852-1090	12678
P302 & J403		Cable Assembly	B852-1091	12678
	7	Amplifier Module Assy.	B852-1131-2	12678
	7	Coupler Assembly	B852-1136	12678

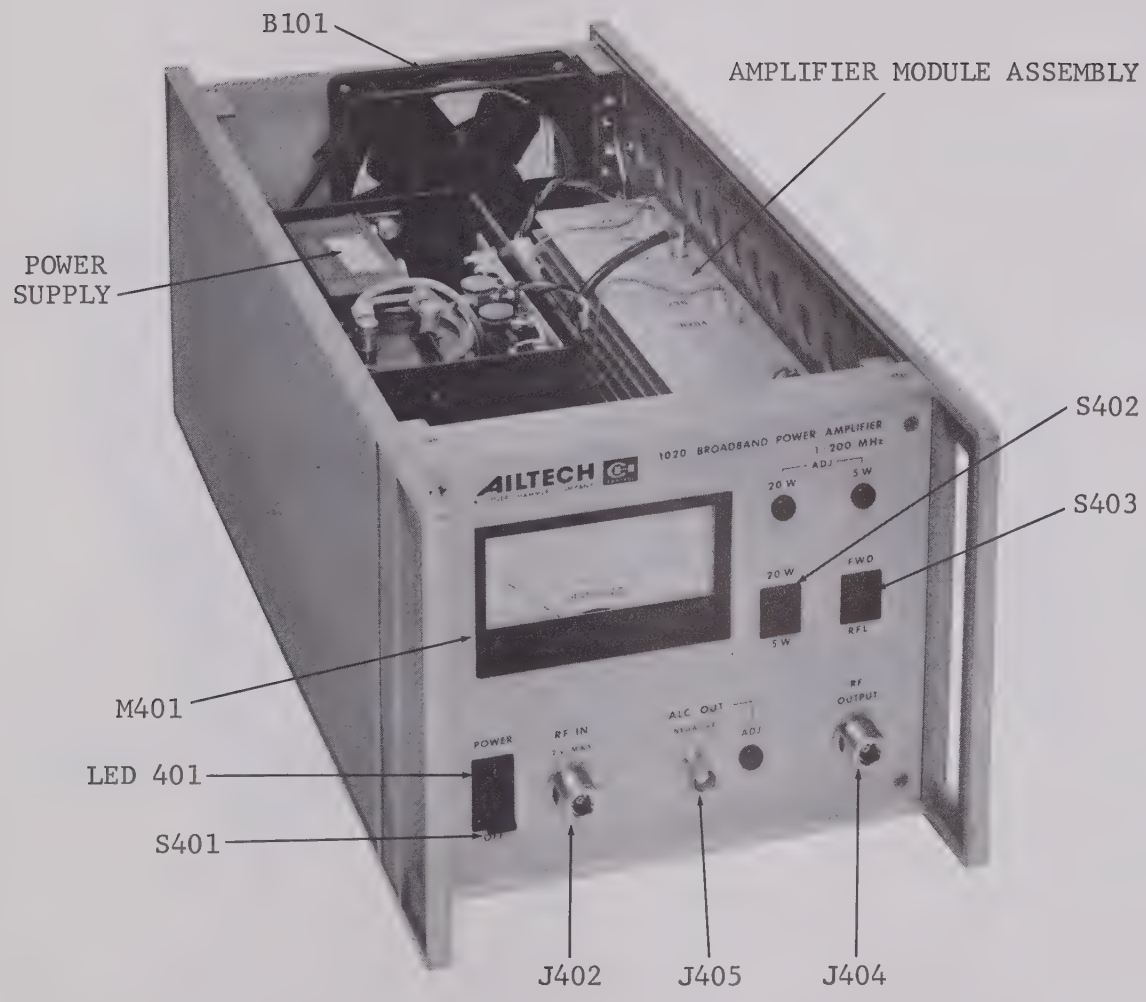


FIGURE 6. COMPONENT IDENTIFICATION, 1020

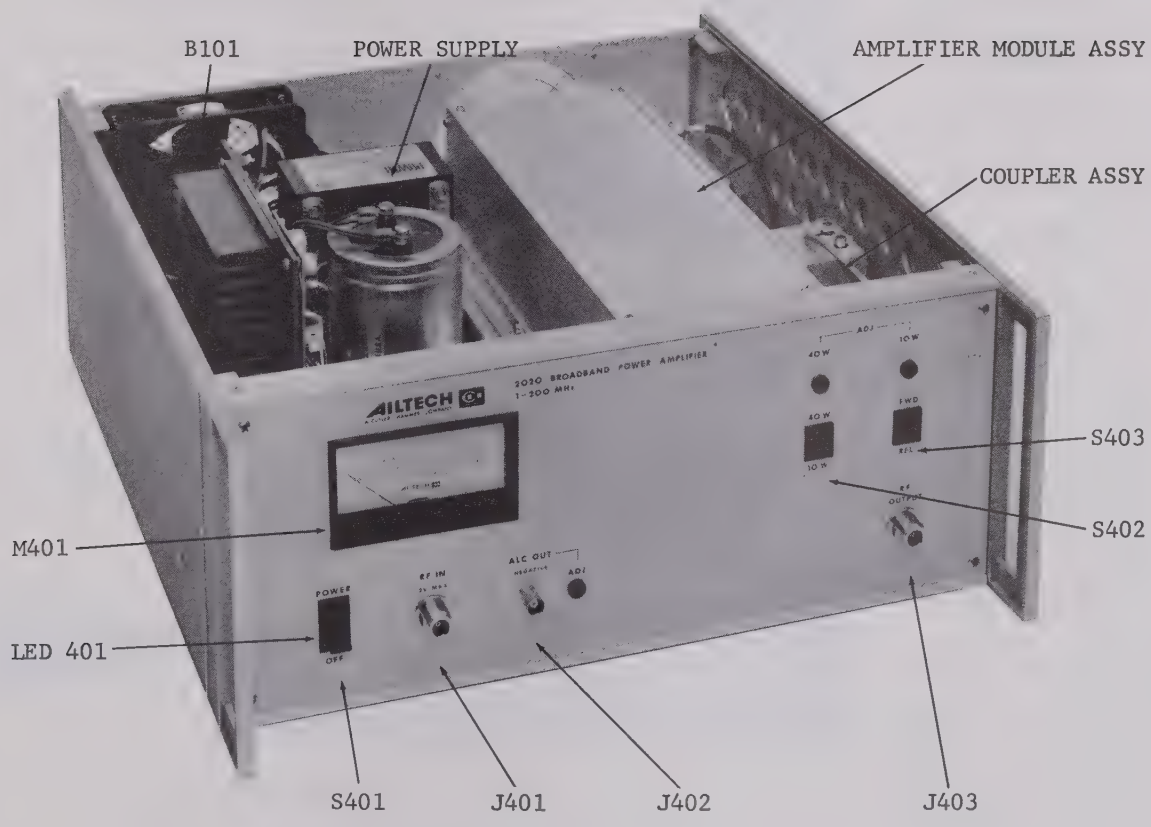


FIGURE 7. COMPONENT IDENTIFICATION, 2020/5020

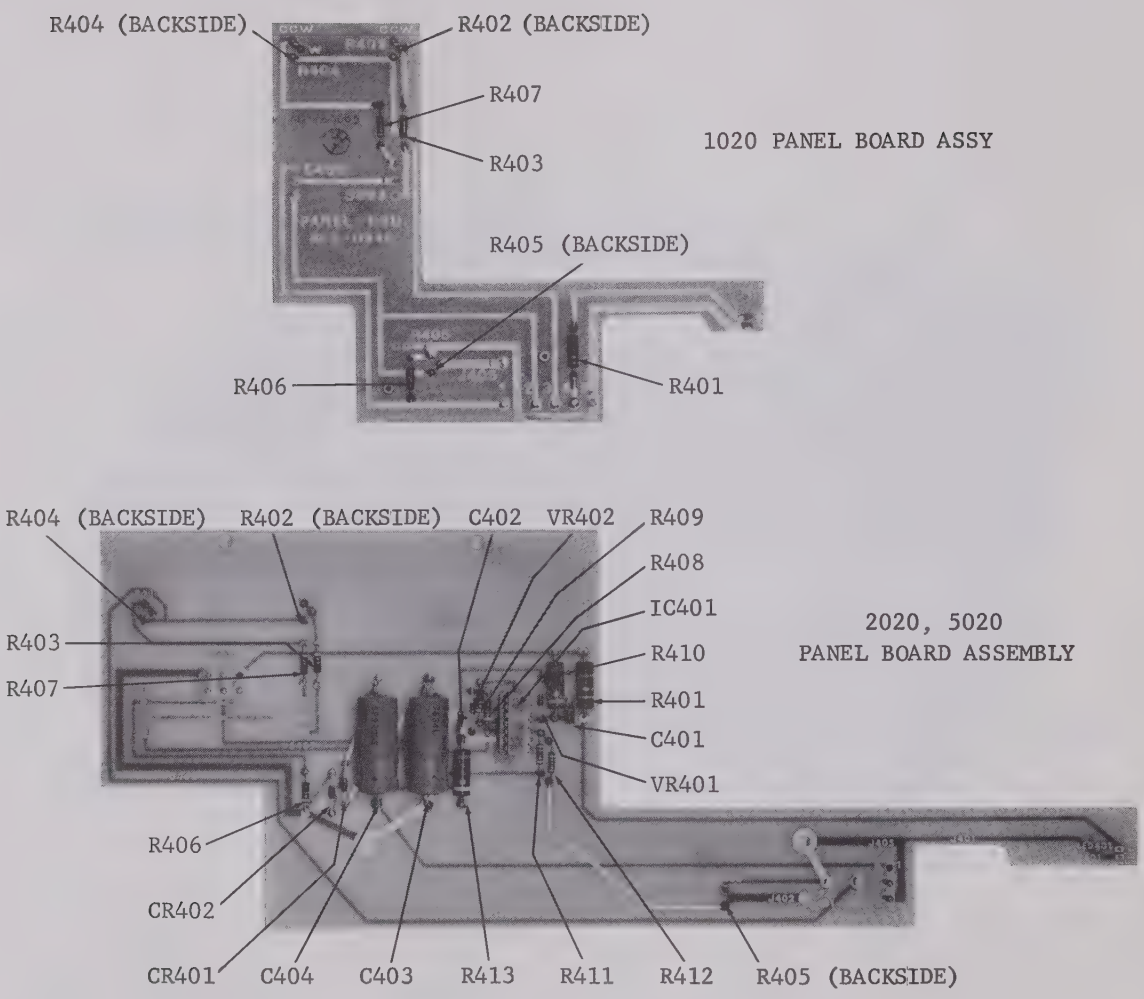
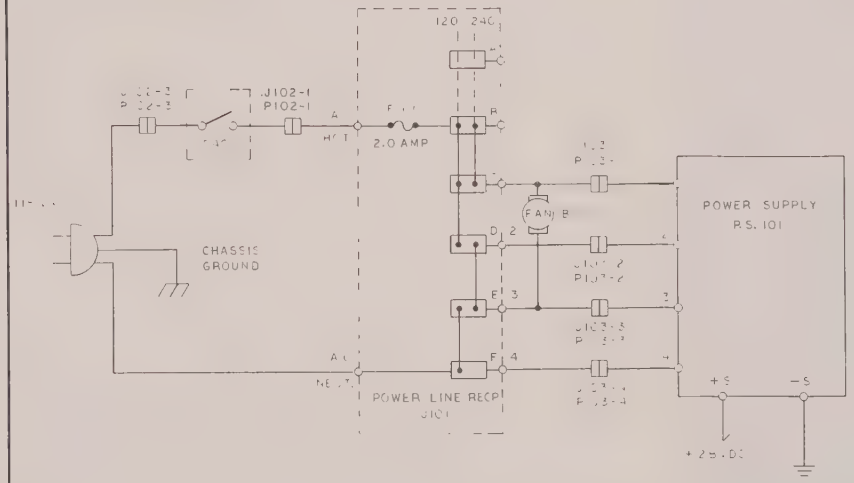


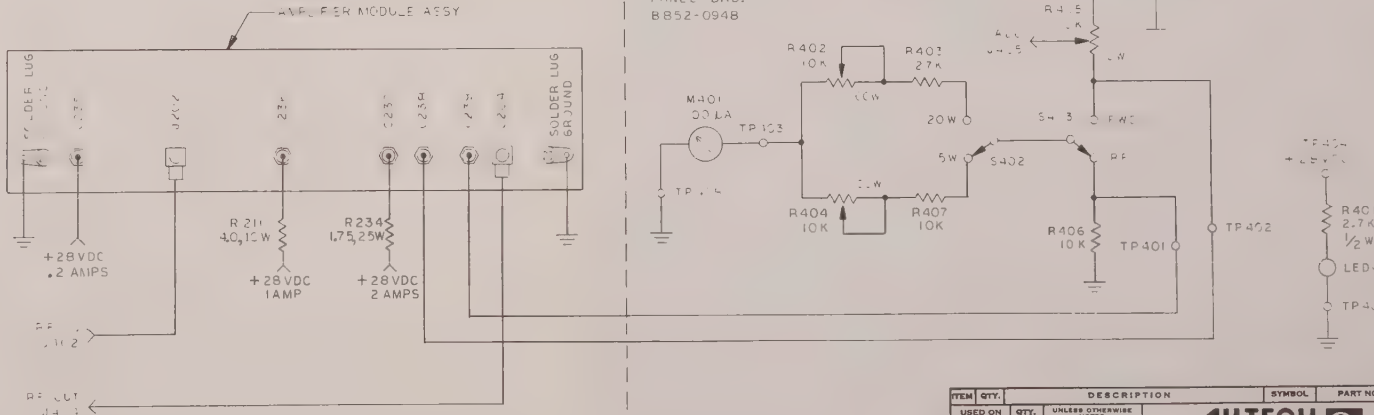
FIGURE 8. PANEL BOARD ASSEMBLIES

APPENDIX

Title	Drawing Number
Schematic, 1020 Amplifier	C852-1177
Schematic, 2020 Amplifier	D852-1087
Schematic, 5020 Amplifier	D852-1052
Wiring and Cabling Hookup, 1020	C852-0998
Wiring and Cabling Hookup, 2020/5020	D852-1137
Schematic, Metering Circuit, 2020/5020	B852-1156
Interconnect Drawing, 2020/5020	C852-1157
Interconnect Drawing, 5001	C852-1339
Interconnect Drawing, 20512	C852-1222
Wiring and Hookup, 5001	C852-1335
Wiring and Hookup, 20512/35512	D852-1220

LET	ECO	REVISION DESCRIPTION	BY	DATE	APP





ITEM	QTY.	DESCRIPTION	SYMBOL	PART NO.
USED ON	QTY.			
1020	REF			

UNLESS OTHERWISE NOTED
CONCENTRICITY T.I.R.
SURFACE FINISH: ___ MICRO INCHES
DEC. .XXX ± ___ .XX ± ___
FRAC. ±___
ANG. ±___
HOLE DIA. ___
COMMER. TOL. APPLY TO STOCK DIMENSIONS THREADS TO MIL-S-7742

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AILTECH
A CUTLER HAMMER COMPANY

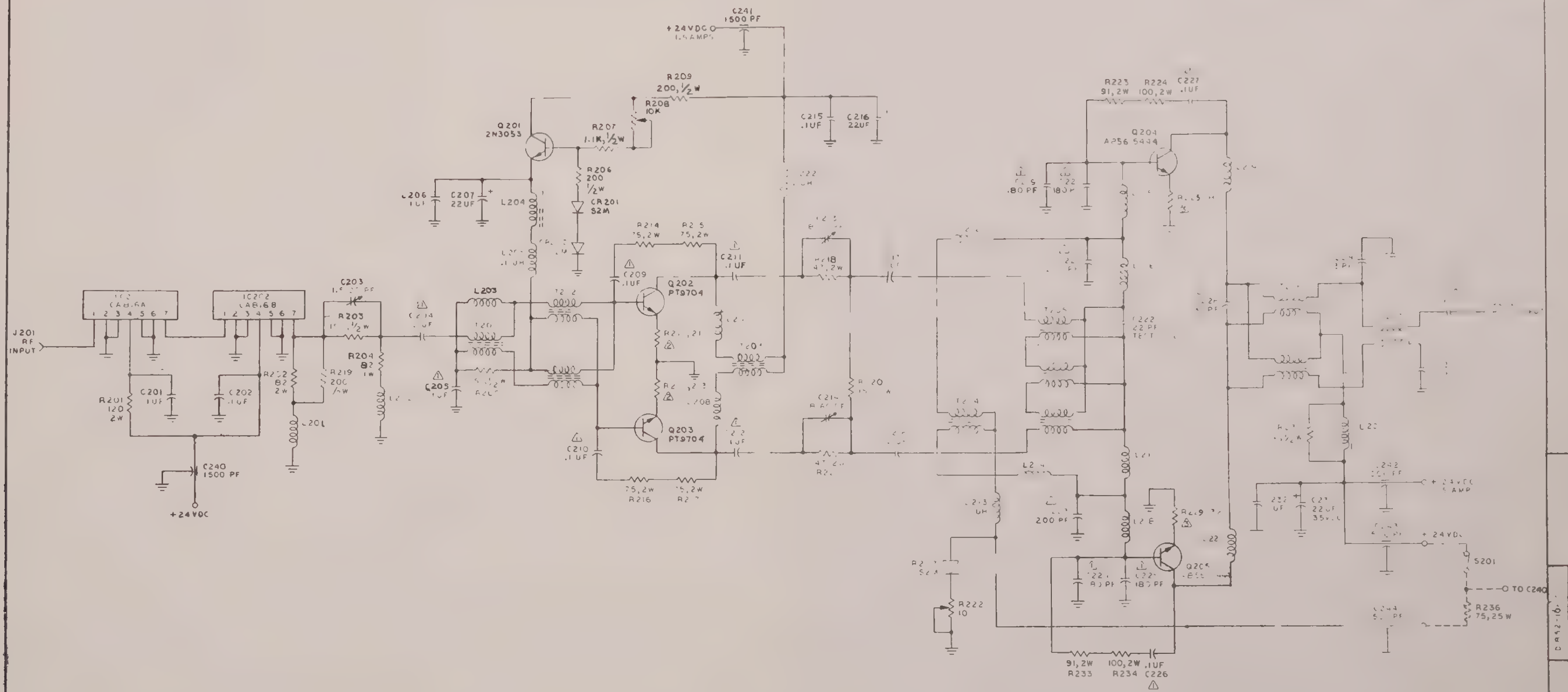
TITLE: SCHEMATIC, 1020

MATERIAL | APP | APP
SURFACE TREATMENT | CHECKED BY | DRAWN BY R. WEBER
SCALE | WT. | DATE 4-21-

DRAWING NUMBER: C852-1177 | REV

1. BREAK ALL SHARP EDGES
NOTES: UNLESS OTHERWISE SPECIFIED

BISHOP GRAPHICS/ACCUPRESS
REORDER NO. A 5238


J201 RF INPUT
IC202 CA8168
C240 1500 PF
+24VDC
R201 120 2W
C201 .1UF
C202 .1UF
R203
R204 82 1W
R202 82 2W
R219 200
L201
C203
L203
C205
Q201 2N3053
C206
C207 22UF
L204
R207 1.1K, 1/2W
R208 10K
R209 200, 1/2W
R206 200 1/2W
CR201 S2M
+24VDC 1.5 AMPS
C241 1500 PF
C215 .1UF
C216 22UF
R214 75,2W
R215 75,2W
C209 .1UF
Q202 PT9704
C211 .1UF
Q203 PT9704
C210 .1UF
75,2W R216
75,2W
L208
R218
R222 10
200 PF
R223 91,2W
R224 100,2W
C227 .1UF
Q204 A256 5444
C222 22 PF
91,2W R233
100,2W R234
.1UF C226
+24VDC
S201
TO C240
R236 75,25W

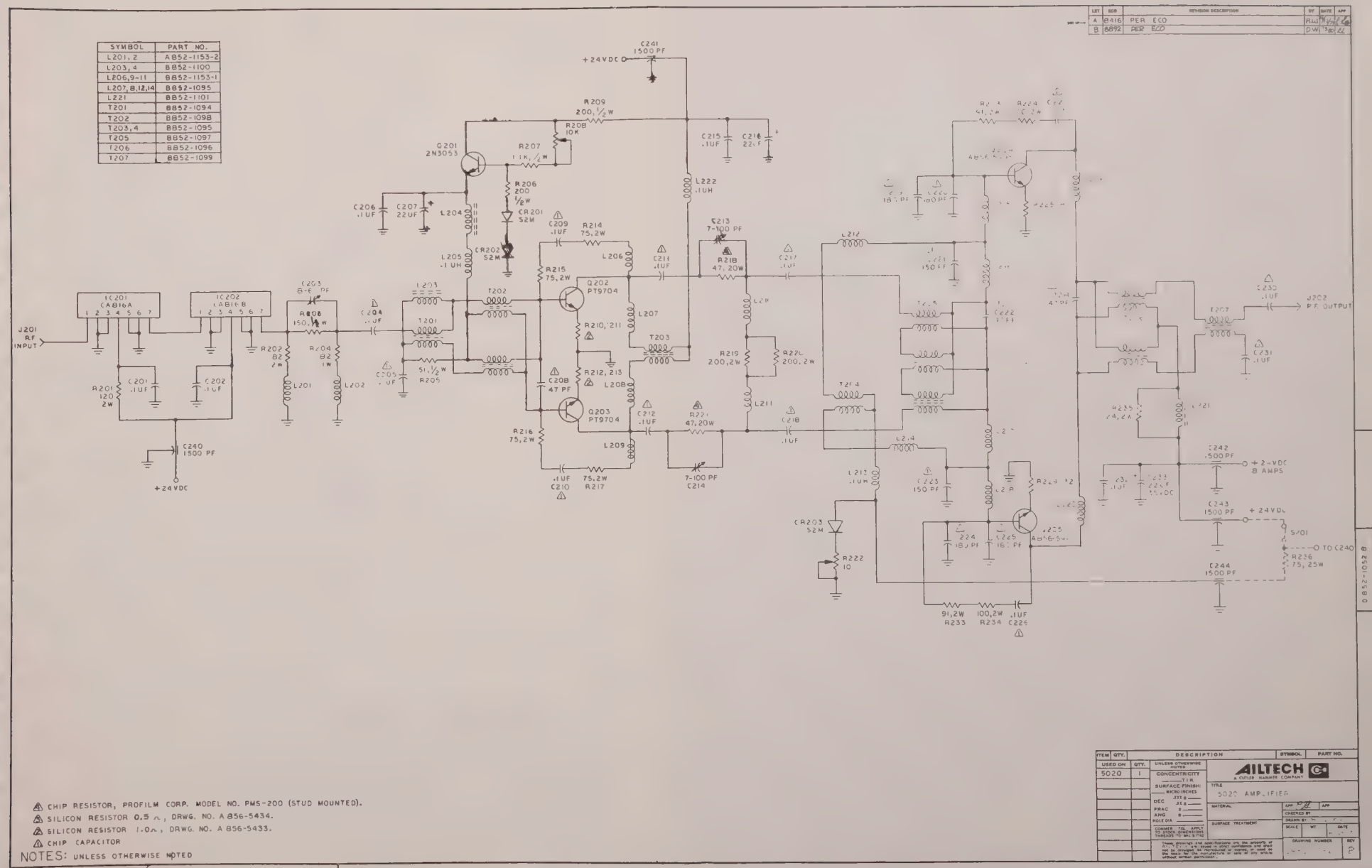
△ SILICON RESISTOR 0.75Ω, DRWG. NO. A 856-5434.
△ SILICON RESISTOR 3.0Ω, DRWG. NO. A 856-5433.
△ CHIP CAPACITOR
NOTES: UNLESS OTHERWISE NOTED

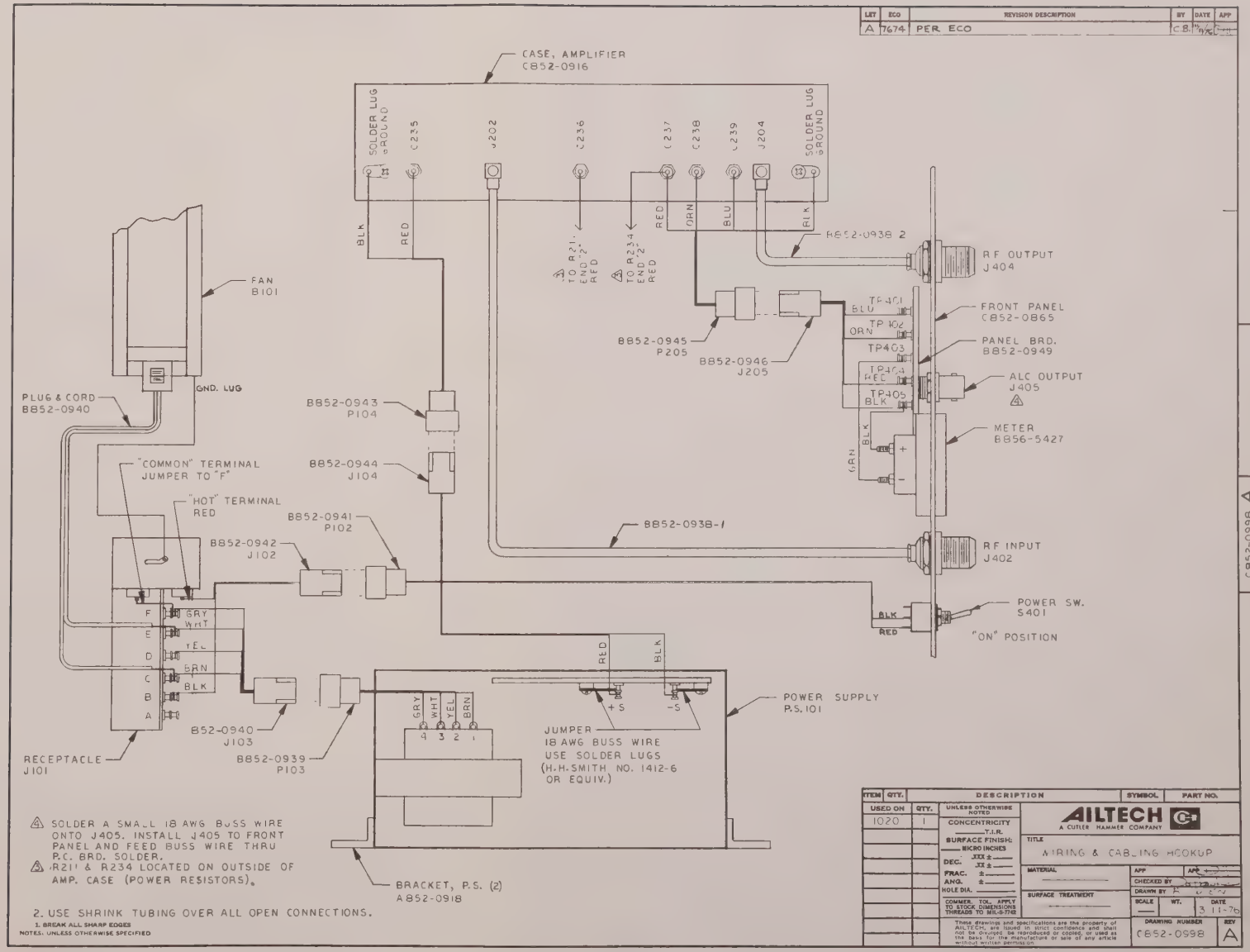
USED ON	QTY
2020	1

AILTECH

TITLE: 2020 AMPLIFIER

DRAWING NUMBER: D852-1087


SYMBOL | PART NO.
L201, 2 | A852-1153-2
L203, 4 | B852-1100
L206, 9-11 | B852-1153-1
L207, 8, 12, 14 | B852-1095
L221 | B852-1101
T201 | B852-1094
T202 | B852-1098
T203, 4 | B852-1095
T205 | B852-1097
T206 | B852-1096
T207 | B852-1099
REVISION DESCRIPTION
A 8416 PER ECO
B 8892 PER ECO
J201 RF INPUT
+24VDC
C241 1500 PF
R209 200, 1/2 W
R208 10K
R207 1 1K, 1/2 W
Q201 2N3053
R206 200 1/2W
CR201 52M
CR202 52M
C206 .1UF
C207 22UF
L204
L205 .1 UH
C209 .1UF
R214 75,2W
L206
C211 .1UF
C213 7-100 PF
R218 47, 20W
L222 .1UH
C215 .1UF
C218 22UF
C217 .1UF
L212
L210
L207
T203
R219 200,2W
R220 200, 2W
L211
C218 .1UF
T204
L214
L213 .1UH
C223 150 PF
R224 12
L215
CR203 52M
R222 10
L224 18, PF
L225 18, PF
A856-5434
R233 91,2W
R234 100,2W
C225 .1UF
R235 4,2W
L221
C242 .500 PF
+24VDC 8 AMPS
C243 1500 PF +24VDC
C244 1500 PF
S201
TO C240
R236 75, 25W
C230 .1UF
J202 RF OUTPUT
C231 .1UF
T207
IC201 CA816A
IC202 CA816B
1 2 3 4 5 6 7
C203 8-6 PF
R208 150, 1/2W
C204 .1UF
T202
T201
C205 .1UF
R205 51, 1/2 W
R202 82 2W
R204 82 1W
L201
L202
C201 .1UF
C202 .1UF
R201 120 2W
C240 1500 PF
+24VDC
C208 47 PF
R210, 211
R212, 213
L208
Q202 PT9704
Q203 PT9704
R216 75,2W
L209
C212 .1UF
R221 47,20W
C210 .1UF
R217 75,2W
C214 7-100 PF
L203
L204
L205
L206
L207
L208
L209
L210
L211
L212
L213
L214
L215
T201
T202
T203
T204
T205
T206
T207
L221
L222
L223
L224
L225
C201
C202
C203
C204
C205
C206
C207
C208
C209
C210
C211
C212
C213
C214
C215
C217
C218
C223
C225
C230
C231
C240
C241
C242
C243
C244
R201
R202
R204
R205
R206
R207
R208
R209
R210, 211
R212, 213
R214
R215
R216
R217
R218
R219
R220
R221
R222
R224
R233
R234
R235
R236
S201
CR201
CR202
CR203
Q201
Q202
Q203
IC201
IC202
J201
J202
D852-1052-B
ITEM QTY. DESCRIPTION SYMBOL PART NO.
USED ON QTY.
5020 1
UNLESS OTHERWISE NOTED
CONCENTRICITY
SURFACE FINISH: MICRO INCHES
DEC .XX ± .X ±
FRAC ±
ANG ±
EDGE BREAK
CONNECTOR TOL. APPLY TO STOCK DIMENSIONS THREADS TO MIL S 7742
MATERIAL
SURFACE TREATMENT
AILTECH
A CUTLER HAMMER COMPANY
TITLE
5020 AMPLIFIER
APP
CHECKED BY
DRAWN BY
SCALE WT DATE
DRAWING NUMBER
REV
CHIP RESISTOR, PROFILM CORP. MODEL NO. PMS-200 (STUD MOUNTED).
SILICON RESISTOR 0.5 Ω, DRWG. NO. A 856-5434.
SILICON RESISTOR 1.0Ω, DRWG. NO. A 856-5433.
CHIP CAPACITOR
NOTES: UNLESS OTHERWISE NOTED


LET | ECO | REVISION DESCRIPTION | BY | DATE | APP
A | 7674 | PER ECO | C.B.
CASE, AMPLIFIER C852-0916
SOLDER LUG GROUND
C235
J202
C236
C237
C238
C239
J204
SOLDER LUG GROUND
BLK
RED
TO R21, END "2" RED
TO R234 END "2" RED
RED
ORN
BLU
BLK
B852-0938-2
RF OUTPUT J404
FAN B101
GND. LUG
PLUG & CORD B852-0940
B852-0945 P205
B852-0946 J205
TP401 BLU
TP402 ORN
TP403
TP404 RED
TP405 BLK
FRONT PANEL C852-0865
PANEL BRD. B852-0949
ALC OUTPUT J405
METER B856-5427
CAN
BLK
B852-0943 P104
B852-0944 J104
"COMMON" TERMINAL JUMPER TO "F"
"HOT" TERMINAL RED
B852-0941 P102
B852-0942 J102
B852-0938-1
RF INPUT J402
POWER SW. S401
BLK
RED
"ON" POSITION
F GRY WHT
E
D YEL
C BRN
B BLK
A
RECEPTACLE J101
B52-0940 J103
B852-0939 P103
GRY WHT YEL BRN
4 3 2 1
RED
BLK
+S
-S
JUMPER 18 AWG BUSS WIRE USE SOLDER LUGS (H.H.SMITH NO. 1412-6 OR EQUIV.)
POWER SUPPLY P.S.101
BRACKET, P.S. (2) A852-0918
SOLDER A SMALL 18 AWG BUSS WIRE ONTO J405. INSTALL J405 TO FRONT PANEL AND FEED BUSS WIRE THRU P.C. BRD. SOLDER.
R21 & R234 LOCATED ON OUTSIDE OF AMP. CASE (POWER RESISTORS).
2. USE SHRINK TUBING OVER ALL OPEN CONNECTIONS.
1. BREAK ALL SHARP EDGES
NOTES. UNLESS OTHERWISE SPECIFIED
ITEM | QTY. | DESCRIPTION | SYMBOL | PART NO.
USED ON | QTY.
1020 | 1
UNLESS OTHERWISE NOTED
CONCENTRICITY T.I.R.
SURFACE FINISH: MICRO INCHES
DEC. .XXX ± .XX ±
FRAC. ±
ANG. ±
HOLE DIA.
COMMER. TOL. APPLY TO STOCK DIMENSIONS THREADS TO MIL-S-7742
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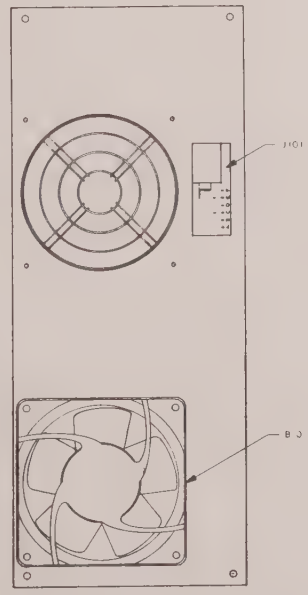
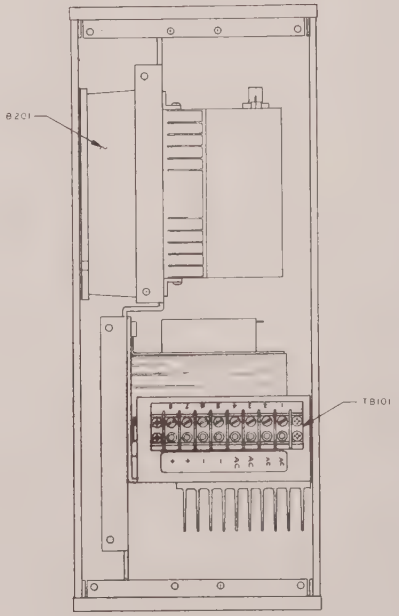
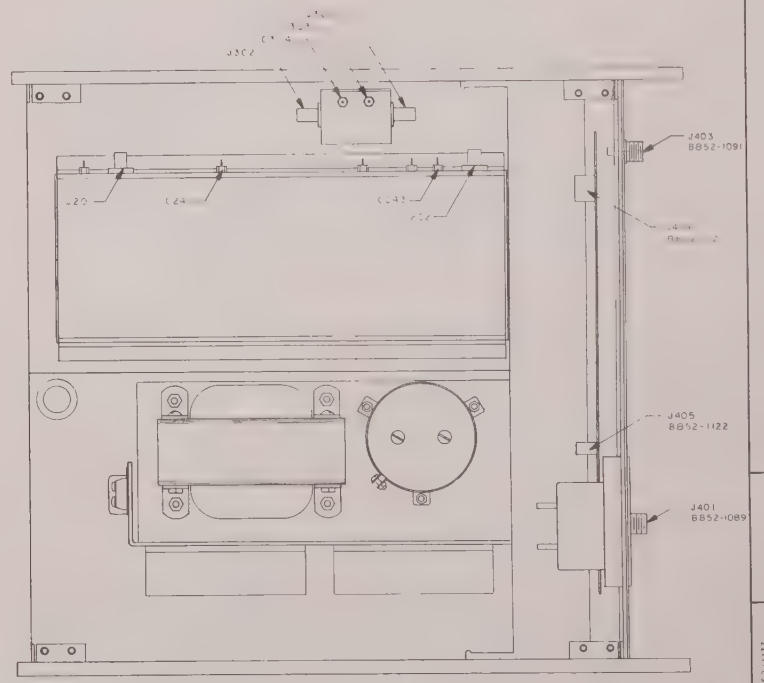
AILTECH A CUTLER HAMMER COMPANY
TITLE WIRING & CABLING HOOKUP
MATERIAL
SURFACE TREATMENT
APP
CHECKED BY
DRAWN BY
SCALE
WT.
DATE 3-11-76
DRAWING NUMBER C852-0998
REV A
C852-0998 A

LET	ECO	REVISION DESCRIPTION	BY	DATE	APP







PART NO.	WIRE NO.	COLOR	FROM	TO	
B852-1121	110	RED	J404-2	C303	2 CONDUCTOR SHIELDED
B852-1121	111	BLK	J404-3	C304	
B852-1121	113	BLK	J404-5	TB101 (NEG.)	
B852-1121	114	RED	J404-6	TB101 (POS.)	
———	115	RED	C241	TB101 (POS.)	
———	118	RED	C243	TB101 (POS.)	
———	121	GRN	GND LUG(AMP)	TB101 (NEG.)	
———	105	BRN	J101-"C"	TB101-AC(1)	TWISTED PAIR
———	106	ORN	J101-"D"	TB101-AC(2)	TWISTED PAIR
———	107	YEL	J101-"E"	TB101-AC(3)	
———	108	BLU	J101-"F"	TB101-AC(4)	
———	109	GRN	J101-GND LUG	TB101 (NEG.)	
———	———	BLK (1)	B101	TB101-AC(1)	
———	———	BLK (2)	B101	TB101-AC(3)	
———	———	BLK (1)	B201	TB101-AC(1)	
———	———	BLK (2)	B201	TB101-AC(3)	
B852-091	———	COAX	P301	J301	
B852-1090	———	COAX	P302	J302	
B852-1090	———	COAX.	P202	J202	
B852-1089	———	COAX.	P201	J201	
B852-1123	———	———	P102	J102	
B852-1122	120	RED	J405-1	P5.101 ?	

4	ONE	CABLE ASSY., P202 & P302		B852-1090
3	ONE	HARNESS, J404	J404	B852-1121
-2 5020	2	ONE	FINAL ASSEMBLY, 5020		0852-1133
-1 2020	1	ONE	FINAL ASSEMBLY, 2020		0852-1132
ITEM	QTY.		DESCRIPTION	SYMBOL	PART NO.

USED ON	QTY.
2020	1
5020	1

UNLESS OTHERWISE NOTED
CONCENTRICITY T.I.R.
SURFACE FINISH — RMS MICRO INCHES
DEC. XXX ± —— .XX ± ——
FRAC. ± ——
ANG. ± ——
EDGE DIS. ——
CORNER TOL. APPLY TO STOCK SHAPES ONLY. THREADS TO MIL S 7742

AILTECH
A CUTLER HAMMER COMPANY

TITLE: WIRING & CABLE ASSY., P

MATERIAL

SURFACE TREATMENT

APP'D APP

CHECKED BY

DRAWN BY

SCALE WT. DATE

DRAWING NUMBER B852-

REV

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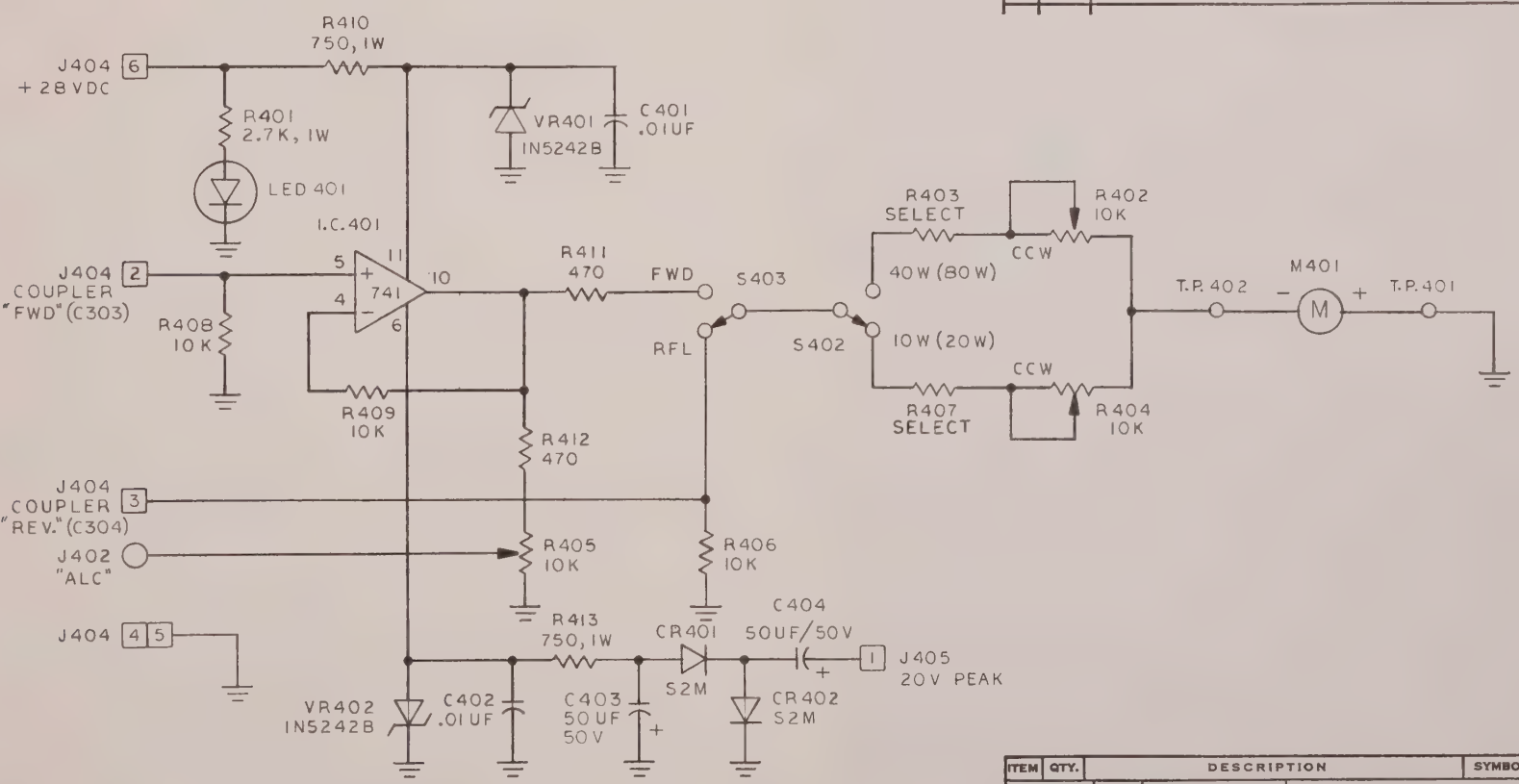
B852-1127

1. MODEL 5020 SHOWN.

NOTE:

B852-1156

LET	ECO	REVISION DESCRIPTION	BY	DATE	APP



1. ALL RESISTORS ARE 1/4 W, 5%.

NOTES: UNLESS OTHERWISE SPECIFIED

ITEM	QTY.	DESCRIPTION	SYMBOL	PART NO.

USED ON	QTY.
2020	1
5020	1

UNLESS OTHERWISE NOTED
CONCENTRICITY ——— T.I.R.
SURFACE FINISH: —— MICRO INCHES
DEC. .XXX ± —— .XX ± ——
FRAC. ± ——
ANG. ± ——
HOLE DIA. ——
COMMER. TOL. APPLY TO STOCK DIMENSIONS THREADS TO MIL-S-7742

AILTECH
A CUTLER · HAMMER COMPANY

TITLE SCHEMATIC
METERING CIRCUIT

MATERIAL ——
SURFACE TREATMENT ——

APP [illegible] APP [illegible]
CHECKED BY [illegible]
DRAWN BY R. WIEN

SCALE	WT.	DATE
——		3-16-77

DRAWING NUMBER B852-1156
REV

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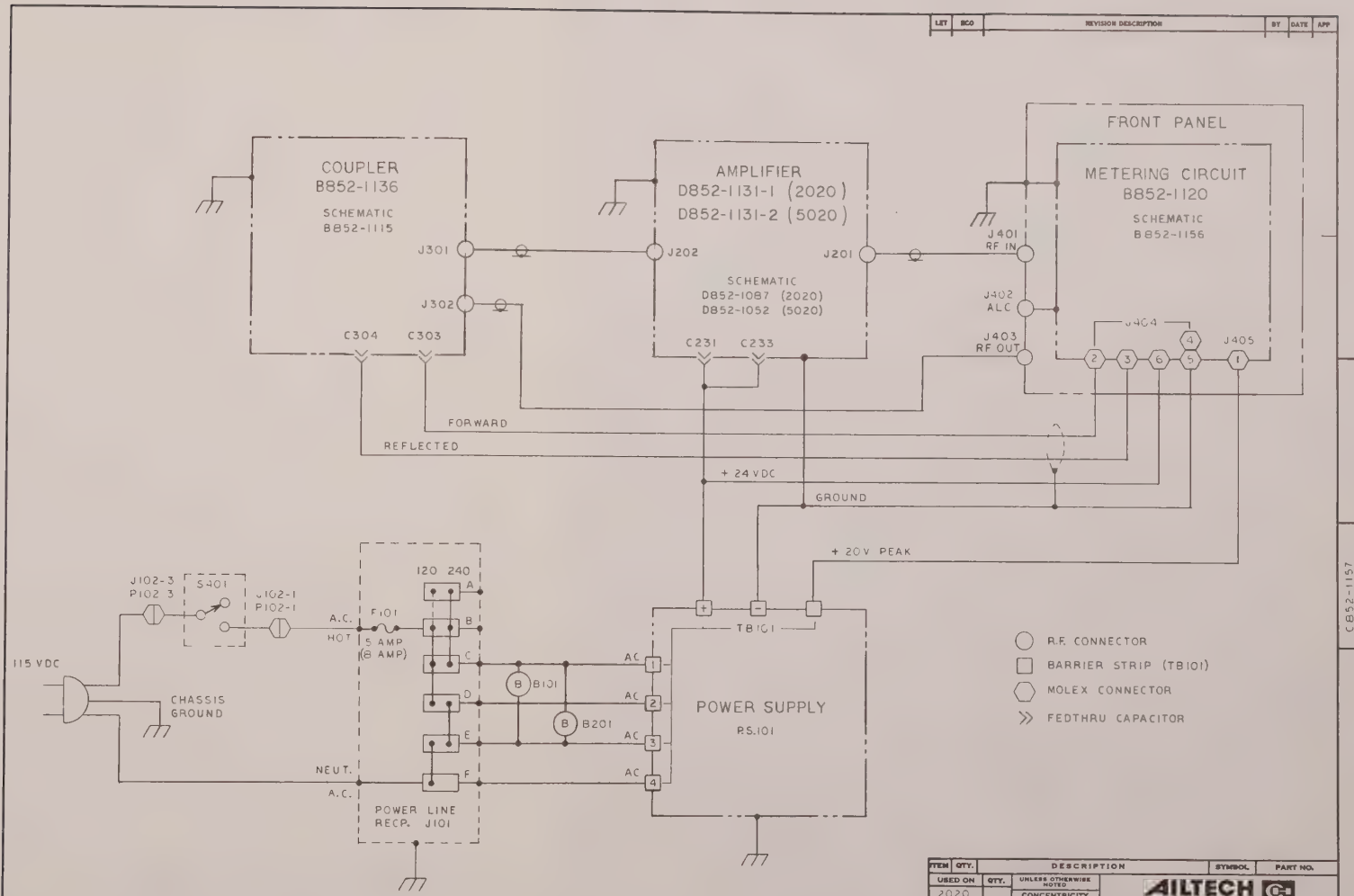

ITEM	QTY.	DESCRIPTION	SYMBOL	PART NO.
USED ON				
2020				
5020				

LTR	ECO	REVISION DESCRIPTION	BY	DATE	APP

AILTECH — A CUTLER HAMMER COMPANY

TITLE: INTERCONNECT DRWG.

MATERIAL

SURFACE TREATMENT

APP [illegible] APP [illegible]

CHECKED BY: [illegible]

DRAWN BY R. WIEN

SCALE — WT. — DATE 3-6-77

DRAWING NUMBER C852-1157 — REV

UNLESS OTHERWISE NOTED
CONCENTRICITY ____ T.I.R.
SURFACE FINISH: ____ MICRO INCHES
DEC. .XXX ± ____ .XX ± ____
FRAC. ± ____
ANG. ± ____
HOLE DIA. ____
COMMER. TOL. APPLY TO STOCK DIMENSIONS
THREADS TO MIL-S-7742

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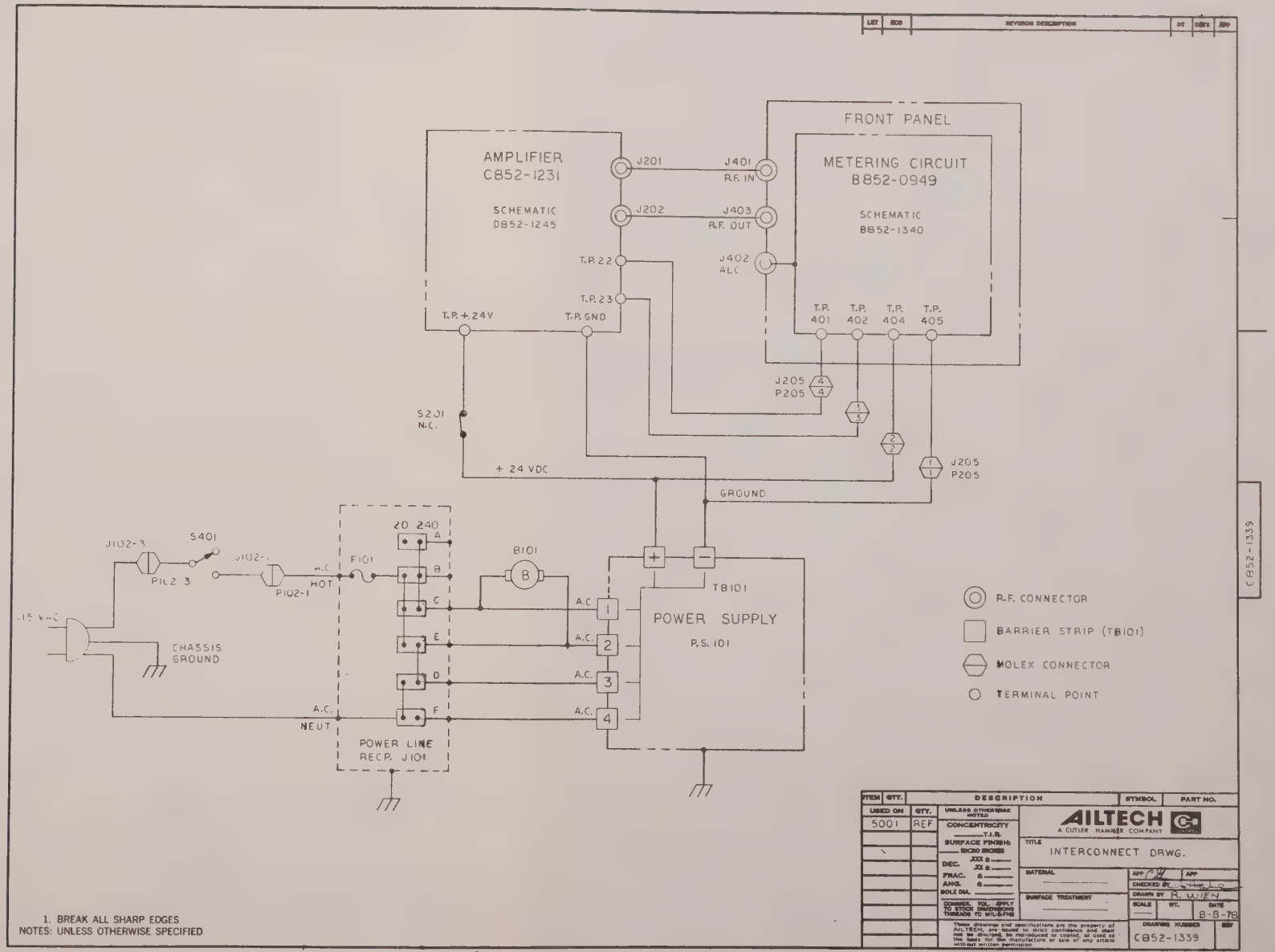
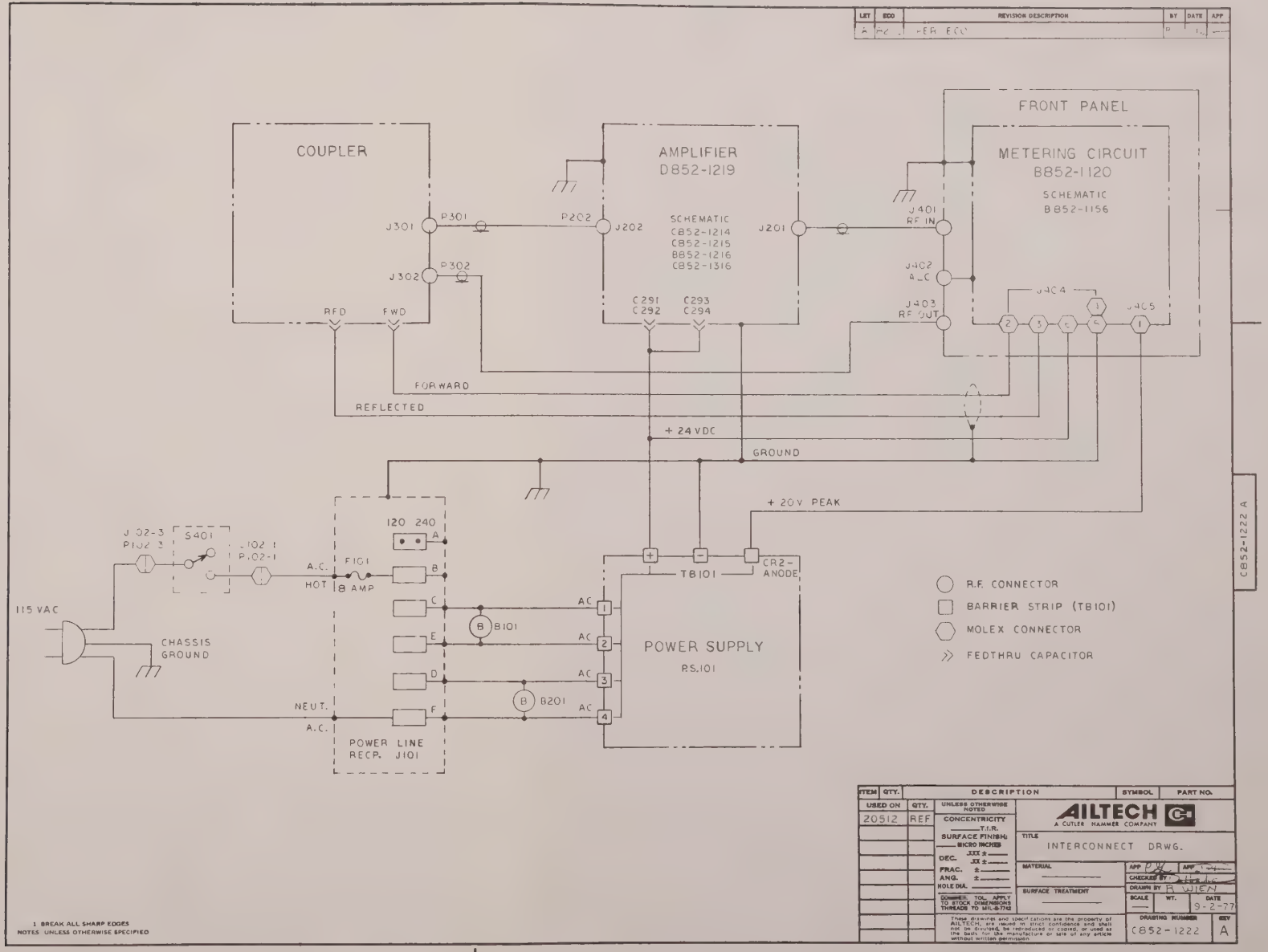
1. BREAK ALL SHARP EDGES
NOTES: UNLESS OTHERWISE SPECIFIED


FRONT PANEL
AMPLIFIER
C852-1231
SCHEMATIC
D852-1245
J201
J202
J401
R.F. IN
J403
R.F. OUT
J402
ALC
METERING CIRCUIT
B852-0949
SCHEMATIC
B852-1340
T.P. 22
T.P. 23
T.P. +24V
T.P. GND
T.P. 401
T.P. 402
T.P. 404
T.P. 405
J205
P205
S201
N.C.
+ 24 VDC
GROUND
J205
P205
S401
J102-3
P102-3
J102-1
P102-1
HOT
F101
20 240
A
B
C
E
D
F
B101
TB101
POWER SUPPLY
P.S. 101
A.C.
NEUT
CHASSIS
GROUND
POWER LINE
RECP. J101
R.F. CONNECTOR
BARRIER STRIP (TB101)
MOLEX CONNECTOR
TERMINAL POINT
C852-1339
1. BREAK ALL SHARP EDGES
NOTES: UNLESS OTHERWISE SPECIFIED
INTERCONNECT DRWG.
DRAWN BY R. WIEN
8-8-78
C852-1339


REVISION DESCRIPTION
FRONT PANEL
METERING CIRCUIT
B852-1120
SCHEMATIC
B852-1156
COUPLER
AMPLIFIER
D852-1219
SCHEMATIC
C852-1214
C852-1215
B852-1216
C852-1316
J301
P301
J302
P302
P202
J202
J201
J401
RF IN
J402
A_C
J403
RF OUT
J404
J405
C291
C292
C293
C294
RFD
FWD
FORWARD
REFLECTED
+ 24 VDC
GROUND
+ 20 V PEAK
J102-3
P102-3
S401
J102-1
P102-1
A.C.
HOT
F101
8 AMP
120 240
115 VAC
CHASSIS
GROUND
B101
B201
NEUT.
A.C.
POWER LINE
RECP. J101
TB101
CR2-
ANODE
POWER SUPPLY
PS.101
R.F. CONNECTOR
BARRIER STRIP (TB101)
MOLEX CONNECTOR
FEDTHRU CAPACITOR
C852-1222 A
1 BREAK ALL SHARP EDGES
NOTES UNLESS OTHERWISE SPECIFIED
ITEM QTY.
DESCRIPTION
SYMBOL
PART NO.
USED ON
20512
QTY.
REF
UNLESS OTHERWISE NOTED
CONCENTRICITY
T.I.R.
SURFACE FINISH:
MICRO INCHES
DEC.
FRAC.
ANG.
HOLE DIA.
DIMENSIONS TOL. APPLY TO STOCK DIMENSIONS
THREADS TO MIL-S-7742
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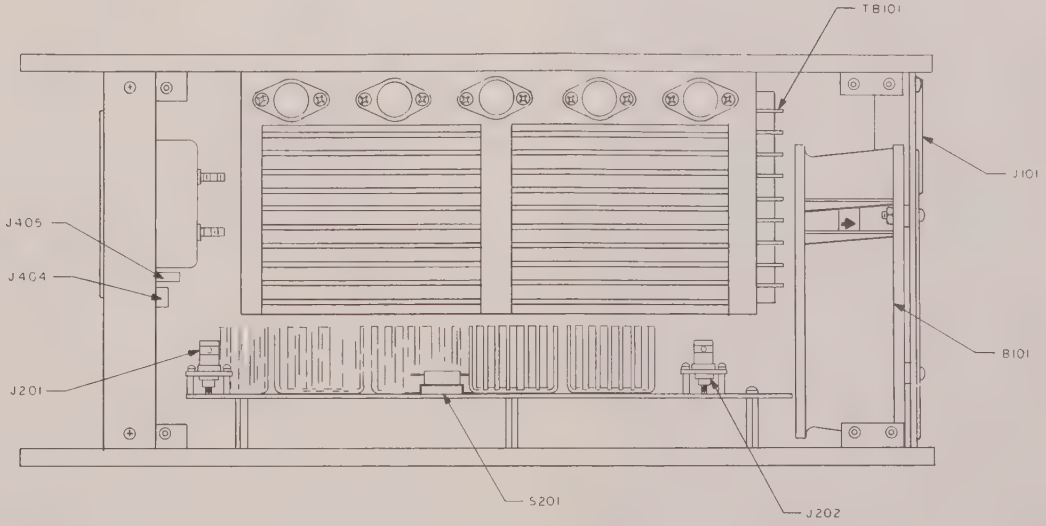
AILTECH
A CUTLER HAMMER COMPANY
TITLE
INTERCONNECT DRWG.
MATERIAL
SURFACE TREATMENT
APP
CHECKED BY
DRAWN BY
R WIEN
SCALE
WT.
DATE
9-2-77
DRAWING NUMBER
C852-1222
REV
A

LET	ECO	REVISION DESCRIPTION	BY	DATE	APP



WIRE NO.	PART NO.	COLOR	FROM	TO	
105	———	1	J101-"C"	TB101-AC(1)	
106	———	3	J101-"E"	TB101-AC(2)	
107	———	4	J101-"D"	TB101-AC(3)	
108	———	6	J101-"F"	TB101-AC(4)	
109	———	5	J101-GND LUG	TB101-NEG.	
110	8852-1332	0	P205-1	T.P. GND (AMP.)	
111	8852-1332	2	P205-2	T.P. 101-POS.	
112	8852-1332	3	P205-3	T.P. 23 (AMP.)	
113	8852-1332	6	P205-4	T P 22 (AMP.)	
115	———	2	TB101-POS.	S201-1 (AMP)	
116		2	S201-2(AMP)	T.P.+24(AMP)	
				-	
119	———	5	T.P.GND(AMP)	TB101-NEG.	
	———	BLU(1)FAN	B101	TB101-AC(1)	2
	———	BLU(2)FAN	B101	TB101-AC(2)	2

2 SHORTEN FAN LEADS (IN. LONG) ATTACH SOLDERLESS TERMINALS T&B #RA-2217, OR EQUIV.

1. BREAK ALL SHARP EDGES
NOTES: UNLESS OTHERWISE SPECIFIED

ITEM	QTY.	DESCRIPTION	SYMBOL	PART NO.
USED ON	QTY.			
5001	1			

UNLESS OTHERWISE NOTED
CONCENTRICITY T.I.R.
SURFACE FINISH: ——— EXCEPT INDICATED
DEC. .XXX ± ——— .XX ± ———
FRAC. ± ———
ANG. ± ———
HOLE DIA. ———
CONNER. TOL. APPLY TO STOCK DIMENSIONS THREADS TO MIL-S-7742

AILTECH A CUTLER HAMMER COMPANY

TITLE: FINAL WIRE & HOOKUP

MATERIAL ——— APP ——— APP ———
CHECKED BY ———
DRAWN BY R. LUCIEN
SURFACE TREATMENT ———
SCALE ——— WT. ——— DATE 7-31-78

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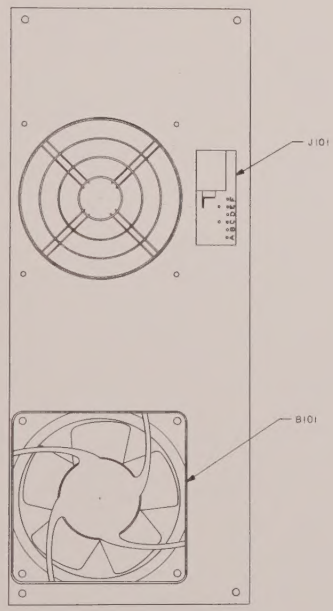
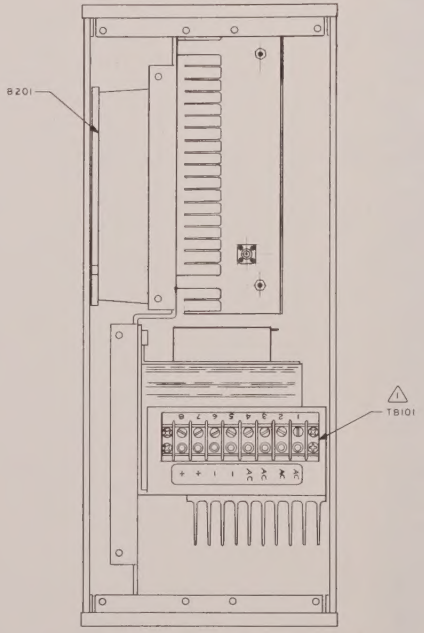
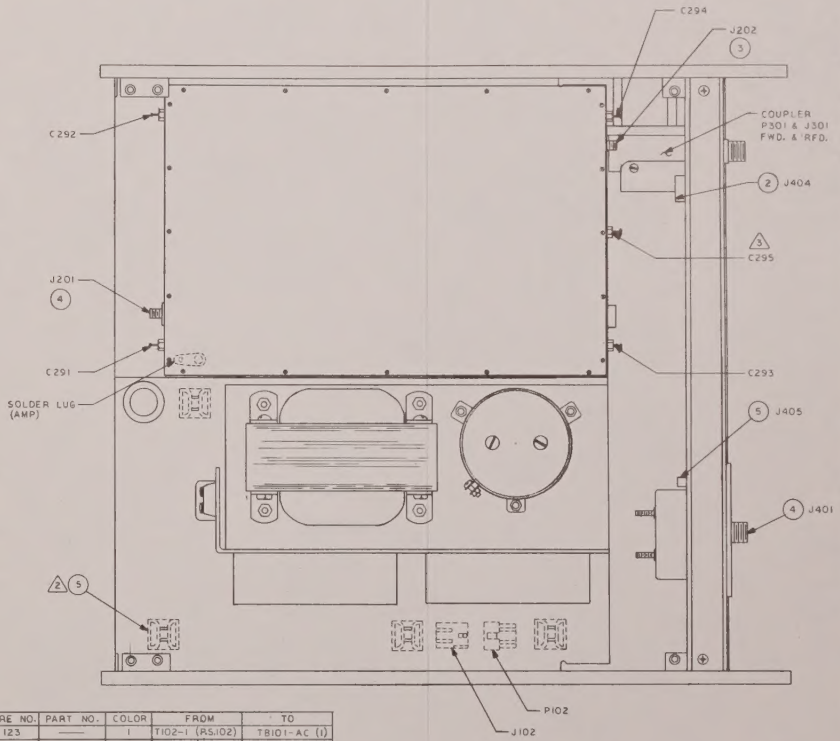
DRAWING NUMBER C852-1335 REV

C852-1335

LET	ECO	REVISION DESCRIPTION	BY	DATE	APP
A	8200	PER ECO	RJL	9/15/77	







TWISTED PAIR
TWISTED PAIR
2 CONDUCTOR SHIELDED

WIRE NO.	PART NO.	COLOR	FROM	TO
105	———	1	J101-"C"	TB101-AC(1)
106	———	3	J101-"E"	TB101-AC(2)
107	———	4	J101-"D"	TB101-AC(3)
108	———	6	J101-"F"	TB101-AC(4)
109	———	5	J101-GND LUG	TB101-NEG.
110	B852-1121	2	J404-2	COUPLER-FWD.
111	B852-1121	0	J404-3	COUPLER-RFL.
113	B852-1121	0	J404-5	TB101-NEG.
114	B852-1121	2	J404-6	TB101-POS.
115	———	2	C291	TB101-POS.
116	———	2	C292	TB101-POS.
117	———	2	C293	TB101-POS.
118	———	2	C294	TB101-POS.
119	———	5	GND LUG(AMP)	TB101-NEG.
120	———	2	J405-1	P.S.101-CR2 (ANODE LEAD)
———	B852-1210	COAX.	P201	J201
———	B852-1213	COAX.	P202	J202
———	B852-1213	COAX.	P301 (COUPLER)	J301 (COUPLER)
———	———	BLK (1)	B101	TB101-AC(1)
———	———	BLK(2)	B101	TB101-AC(2)
———	———	BLU (1)	B201	TB101-AC(3)
———	———	BLU(2)	B201	TB101-AC(4)

WIRE NO.	PART NO.	COLOR	FROM	TO
⚠ 123	———	1	T102-1 (RS.102)	TB101-AC (1)
⚠ 124	———	3	T102-3 (RS.102)	TB101-AC (2)
⚠ 125	———	4	T102-2 (RS.102)	TB101-AC (3)
⚠ 126	———	6	T102-4 (P.S.102)	TB101-AC (4)
⚠ 127	———	5	P.S.102-−V	TB101-NEG.
⚠ 128	———	7	P.S.102-+V	C295

3 USED ON 35512 ONLY.

2 ATTACH APPROX. AS SHOWN, FAR SIDE 4 PLCS.

1 REMOVE ALL STRAPS ON TB101 BEFORE MAKING ANY CONNECTIONS.

NOTES:

ITEM	QTY.	DESCRIPTION	SYMBOL	PART NO.
5	ONE	HARNESS, J405		B852-1122
4	ONE	CABLE ASSY., P201 & J401		B852-1210
3	ONE	CABLE ASSY., P202 & P302		B852-1090
2	ONE	HARNESS, J404	J404	B852-1121
1	ONE	FINAL ASSEMBLY		D852-1221

USED ON	QTY.
20512	1
35512	1

UNLESS OTHERWISE NOTED: CONCENTRICITY T.I.R. —— SURFACE FINISH: MICRO INCHES —— DEC. XXX ± —— FRAC. ± —— ANG. ± —— HOLE DIA. ——

CONNER. TOL. APPLY TO STOCK DIMENSIONS THREADS TO MIL-S-7742

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AILTECH
A CUTLER-HAMMER COMPANY

TITLE: WIRING & HOOKUP

MATERIAL —— APP 9/15/77

SURFACE TREATMENT —— CHECKED BY J. Hughes

DRAWN BY M. WIEN

SCALE —— WT. —— DATE 9-15-77

DRAWING NUMBER D852-1220 REV

MP MASTER
MA23211